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## Investigation of orthorhombic and tetragonal phases of $\text{Cs}_2\text{CuCl}_{4-x}\text{Br}_x$ mixed system

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The  $\text{Cs}_2\text{CuCl}_{4-x}\text{Br}_x$  mixed system exists in orthorhombic and tetragonal polymorphs and is an example of the low-dimensional quantum spin systems. The different  $\text{Cu}^{2+}$  environments and their influence on the magnetic properties are important to understand the change of magnetic behaviour by applying magnetic field. The orthorhombic mixed system was studied by neutron single crystal diffraction with and without magnetic field. It shows a rich magnetic phase diagram consisting of four regimes depending on the Br concentration and is characterised by different exchange coupling mechanisms. Inelastic neutron scattering experiments on MIRA for the compound from regime III ( $2 < x < 3.2$ ) with  $x=2.2$  show dynamical correlations at a temperature around 50 mK giving evidence for a spin liquid phase [1].

$I4/mmm$  has been used to describe the tetragonal polymorphs. The magnetic behaviour of such tetragonal compounds can be described as quasi-2D antiferromagnets with a transition temperature  $T_N$  between 9K and 11K, depending on the Br content [2]. New single-crystal neutron diffraction experiments on RESI indicate a very small orthorhombic distortion at low temperature. The structure solution shows a subgroup relationship for the investigated composition of this mixed system.

[1] N. van Well et al., Ann. Phys. (Berlin), 2000147, (2020),

[2] N. van Well et al., Cryst. Growth Des., 19, 11, 6627-6635 (2019)

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